Lecture 4
Theories of Decision Making

Dr Cillian McHugh

PS4168: Economic Psychology

Overview

- Approaches to Studying Decision Making (revision)
- Expected Value/Expected Utility Theory
  - Bayes Theorem
- Prospect Theory
- Social Functionalist Theory
- Dual-Process Theories
- Mental Models

Recap

- Describe 3 nudges
  - **and** the theory behind them

Recap

Homo Economicus?

- a rational individual
- makes rational decisions
- that maximize utility
- is self-interested
- capable of learning from experience
- stable, consistent preferences (Ranyard, 2018, p. 6; see also Lea, Tarpy, & Webley, 1987; Wärneryd, 2008)

Approaches to Studying Decision Making

- Normative Theories *versus* Behavioural Theories

- Normative (prescriptive) approaches
  - Influenced by economic and mathematical models of how decisions **should** be made
  - Assume people are rational
    - should make the optimal choice (the choice that best reflects the person's preferences)
    - decisions should be consistent across settings

- Behavioural (descriptive) approaches
  - Describe how decisions are made

Defining Rationality

- Epistemic rationality
    - Rational belief or inference
    - Has a conclusion that is true
- Rationality of action
    - Actions (as opposed to beliefs/inferences)
    - Helps to achieve a goal
- **Instrumental rationality**
    - "our mental states or processes are rational when they help us to achieve our goals" (Over, 2004, p. 3)

Expected Value / Expected Utility Theory

Expected Value

- Which gamble would you rather play?

  - **A:** 20% chance of winning €5
  - **B:** 30% chance of winning €4

- Pick the option with the highest *Expected Value*

  - EV = probability of outcome x value of outcome

- EV(A) = 20% x €5 = €1

- EV(B) = 30% x €4 = €1.20

- **B has greater expected value**

Problem with Expected Value

- Not every Euro has the same subjective value
    - Low income: €100 would allow person to eat better food or buy new clothes
    - High income: €100 would not need to be spent on necessities
- Lotteries
    - Pay €1 for a 1/52,000,000 chance to win €10,000,000
        - Expected value of this gamble is less than €1

Expected Utility

- Utility = subjective value

  - represents whatever people want to achieve (Von Neuman & Morgenstern, 1947)

- EU = probability of outcome x utility of outcome

- Lotteries

  - Expected utility of €1 is low - not much you can do with €1
  - Expected utility of the prize is high - could do a lot with that kind of money
    - The low probability of winning does not completely outweigh the high utility of the prize
  - There is also the pleasure in dreaming about winning

Predictions of Expected Utility Theory

- Choices consistent across transformations
    - a: 45% chance of €200 vs b. 50% chance of €150
    - a: 90% chance of €200 vs b. 100% chance of €150
- Preferences stable across measures
    - Do you prefer A or B?
    - Would you pay more for A or B?

Bayes Theorem

$$p(y|x) = \frac{p(x|y)p(y)}{p(x)}$$

Prospect Theory

Prospect Theory

- Kahneman & Tversky (1979; 1974) suggested a more realistic approach to describing decision making.

- Prospect theory highlights the exaggerated weighting of expected losses in people's decision making.

- Decision weights instead of probabilities
  - Decision weights are generally slightly lower than probabilities.
    - Though this changes at low probabilities.

Prospect Theory

- Two people had paid a non-refundable deposit of €100 for a weekend at a resort.
  - On the way to the resort, both of them became slightly unwell, and felt they would probably have a more pleasurable time at home than at the resort.
  - Should they drive on or turn back?

Prospect Theory - Sunk Cost

- Prediction of *loss-aversion*
- The sunk-cost effect:
    - extra expenditure in order to avoid a loss.
- This can occur even when additional expenditure is now on a less preferred option.
    - examples?

Recall:

- Choices consistent across transformations
  - a: 45% chance of €200 vs b. 50% chance of €150
  - a: 90% chance of €200 vs b. 100% chance of €150

Prospect Theory - Risk Aversion

- *Sure* gains are chosen over *risky* but possibly greater gains.
  - This is termed **risk aversion**.

- *BUT*

Prospect Theory

- Given the choice of either Option A or Option B below, which one would you go for?
    - a: A sure loss of €800
    - b: An 85% chance of losing €1000, with a 15% chance of losing nothing.

Prospect Theory - Risk Aversion/Seeking?

- Risk aversion can be transformed into risk seeking.
  - We are more likely to take a chance to avoid a loss than we are to make a gain.

Prospect Theory - Practical applications

- Banks et al. (1995) studied the effectiveness of two videotapes in persuading women to undergo a mammogram.

- Same medical facts presented on both tapes, but one emphasised gains of undergoing a test, the other the risks of not undergoing one.

- More of those who watched the risk-focused tape obtained a mammogram in the following 12 months.

Prospect Theory

(Kahneman & Tversky, 1979, p. 279)

Prospect Theory

(Kahneman & Tversky, 1979, p. 283)

Social Functionalist Theory

Social Functionalist Theory

- Tetlock (2002) suggests that we need a more socially aware model of the decision maker.
- Rather than an intuitive *economist* or intuitive *scientist* we might consider:
    - Intuitive politician
    - Intuitive prosecutor
    - Intuitive theologian

Booking a Holiday 1

- You have a chance to by a very cheap holiday to Italy, but you must today.
- You have just recently taken an exam, but you don't know yet whether you've passed or failed.
  - Buy the holiday.
  - Don't buy the holiday.
  - Pay €5 so you can still buy the holiday at the cheap price in two days time.

Booking a Holiday 1 Vote

https://app.sli.do/event/vA4qnxWvojyGN48GM4yFeK/embed/polls/bc02a010-b754-40e8-a03d-84de6a11cdb2

Or go to Slido.com and enter code #3891787

Booking a Holiday 1 Results

https://wall.sli.do/event/vA4qnxWvojyGN48GM4yFeK?section=b501f930-6044-41c0-aafd-b4db68fca3d3

Booking a Holiday 2

- You have a chance to by a very cheap holiday to Italy, but you must today.
- You have just recently taken an exam, and found out that you've passed.
    - Buy the holiday.
    - Don't buy the holiday.
    - Pay €5 so you can still buy the holiday at the cheap price in two days time.

Booking a Holiday 2 Vote

https://app.sli.do/event/j4eFry1KME4EkQnjQi9sjU/embed/polls/
e30fb55e-b1db-4e97-aa52-c1bc5e505193

Or go to Slido.com and enter code #3891788

Booking a Holiday 2 Results

https://wall.sli.do/event/j4eFry1KME4EkQnjQi9sjU?section=ed0
0b877-f3d9-4c4f-bc3c-54ab11a1c2f0

Booking a Holiday 3

- You have a chance to by a very cheap holiday to Italy, but you must today.
- You have just recently taken an exam, and found out that you've failed.
    - Buy the holiday.
    - Don't buy the holiday.
    - Pay €5 so you can still buy the holiday at the cheap price in two days time.

Booking a Holiday 3 Vote

https://app.sli.do/event/7Ts4GvWhiowWJoAhdHkvAb/embed/polls/def899ec-dda8-4941-8773-c9613793c4c9

Or go to Slido.com and enter code #3891789

Booking a Holiday 3 Results

https://wall.sli.do/event/7Ts4GvWhiowWJoAhdHkvAb?section=3
599c4f8-4037-46c1-a047-635e60beed19

Intuitive Politicians

(making ourselves accountable)

- We are accountable to "a variety of constituencies".
- Sometimes we must be prepared to offer explanations to maintain relationships, or maintain others' perceptions of us.
- The presence of others and the resources for explanation can affect decision making.

Intuitive Prosecutors

- Certain contexts can trigger patterns of decision making that involve more punitive (or less lenient) actions.
- Tetlock et al. (2007) found that a situation where norms have been violated lead to a range of emotional and attributional effects on decision making.
- Strong interactions with conservative vs. liberal beliefs.

Intuitive theologians

- Being an intuitive theologian means acting as though decisions should flow from some higher authority.
- Strong ethical considerations can overwhelm base-rate information.
    - *moral outrage*

Activity

- In Groups:
    - Please Identify an example when you acted as
        - an intuitive politician
        - an intuitive prosecutor
        - an theologian:

What are Dual-Processes?

- System 1 *versus* System 2 (Stanovich, 1999, 2005)

- intuitive / heuristic *versus* analytic (Chaiken, 1980; Evans, 1989, 2006, 2007)

- automatic *versus* controlled (Schneider & Shiffrin, 1977)

- experiential *versus* rational (Epstein, 1994; Epstein & Pacini, 1999; Pacini & Epstein, 1999)

- implicit / tacit *versus* explicit (Evans & Over, 2013; Reber, 1989)

- associative *versus* rule-based (Sloman, 1996; Smith & DeCoster, 2000)

- for reviews see Evans (2010); Evans (2008); and Kahneman (2011)

Features of Dual-processes

- Consciousness
- Evolution
- Functional
- Individual differences

- (Evans, 2008, p. 257)

Features of Dual-processes: Consciousness

Features of Dual-processes: Evolution

Features of Dual-processes: Functional

Features of Dual-processes: Individual differences

Dual Processes and Other Variables

- Cognitive Capacity
  - Individual differences (Barrett, Tugade, & Engle, 2004; Brünken, Steinbacher, Plass, & Leutner, 2002)
  - Manipulated/nature of task (De Neys & Schaeken, 2007; Trémolière, Gagnon, & Blanchette, 2016)
- Construal level and Distancing (Ayduk & Kross, 2010; Fujita, Henderson, Eng, Trope, & Liberman, 2006; Liberman, Sagristano, & Trope, 2002; van Dijke, van Houwelingen, De Cremer, & De Schutter, 2017)
- Need for Cognition
  - "to engage in and enjoy effortful analytic activity" (Cacioppo & Petty, 1982; Forsterlee & Ho, 1999, p. 471)

Dual-processes in Action

Influencing Decisions

- Cognitive Load Manipulations (Deck & Jahedi, 2015)
  - Increased load inhibits System 2
- Results
  - To more risk-averse behavior
  - More impatience over money
  - More susceptible to specific biases (anchoring effects)

Dual-processes in Action

Inhibiting Stereotypes

- Stereotypes lead to prejudices
  - Prejudices are inevitable (Devine, 1989)
- But not all stereotypes are *acceptable*
- System 1 perceives the stereotype
  - causing the prejudice
- System 2 attempts to inhibit the prejudice
- Stereotypes are automatically activated **but** personal beliefs require conscious activation

Dual-processes in Action

Inhibiting Stereotypes

3 Studies (Devine, 1989):
- Study 1:
    - Method:
        - Prejudice measured using the Modern Racism Scale (McConahay, Hardee, & Batts, 1981)
        - Knowledge of Stereotypes measured by open-ended *"list components of stereotype"*
    - Results:
        - No relationship between stereotype knowledge and level of prejudice

Dual-processes in Action

Inhibiting Stereotypes

- Study 2:
    - Method:
        - Prejudice measured using the Modern Racism Scale
        - Stereotypes primed using word lists
        - Judged ambiguous behaviours
    - Results:
        - Evaluation of ambiguous behaviours consistent with stereotype
        - No difference in stereotype activation for high vs low prejudice participants

Dual-processes in Action

Inhibiting Stereotypes

- Study 3:
    - Method:
        - Prejudice measured using the Modern Racism Scale
        - Participants reported *"all of their thoughts"* on the target group
    - Results:
        - Low prejudice responses were less consistent with stereotypes than high prejudice participants
        - People can (sometimes*) monitor and inhibit the influence of automatically activated stereotypes

Limitations of Dual-Process Theories

- Separable systems/processes? (e.g., Mugg, 2015)
- A continuum? (e.g., Alós-Ferrer & Strack, 2014)
- Exclusivity? Switching? (De Neys, 2023)
- Logical intuitions? (De Neys, 2012; Ghasemi, Handley, Howarth, Newman, & Thompson, 2022; Raoelison, Boissin, Borst, & De Neys, 2021)
- How do they work together?

Mental Models

Mental Models

- Proposed by Philip Johnson-Laird (Johnson-Laird, 1983, 2006)

- "Mental models" are descriptions of how we represent information

- A "Mental Model" differs from a "Full model"
    - Incomplete
    - Laziness/cognitive ease

Mental Models

You are permitted to carry out only one of the following two actions:

Action 1: Take the apple or the orange, or both.

Action 2: Take the pear or the orange, or both.

Are you permitted to take the orange?

(Bucciarelli, Khemlani, & Johnson-Laird, 2008; Johnson-Laird, 2006)

Mental Models

Action 1	Action 2
Take the apple	Take the pear
Take the orange	Take the orange
Take both the apple and orange	Take both the pear and orange

Figure 1: mental_models

Mental Models

Figure 2: mental_models

Mental Models

Action 1	Action 2
Take the apple	Take the pear
Take the orange	Take the orange
Take both the apple and orange	Take both the pear and orange

Figure 3: mental_models

Complete Models

Action 1	Action 2
Take the apple	~~Take the pear~~
(Take the orange)	~~Take the orange~~
Take both the apple (and orange)	~~Take both the pear and orange~~

Figure 4: mental_models

Complete Models

<u>Action 1</u>	<u>Action 2</u>
~~Take the apple~~	Take the pear
~~Take the orange~~	(Take the orange)
~~Take both the apple and orange~~	Take both the pear (and orange)

Figure 5: mental_models

Mental Models

Figure 6: mental_models

Mental Models and Incomplete Information

- *All of the napkins are blue*

Mental Models and Incomplete Information

- *All of the napkins are blue*

napkin	blue
napkin	blue
napkin	blue
	blue

Mental Models and Incomplete Information

- *if there's a lily in the vase then there's a rose*

Mental Models and Incomplete Information

- *if there's a lily in the vase then there's a rose*

lily   rose

Figure 8: mental_models

Mental Models and Incomplete Information

- *if there's a lily in the vase then there's a rose*

lily   rose

• • •

Figure 9: mental_models

Mental Models and Spatial Relations

- *the knife is on the right of the fork, and the napkin is on the left of the knife*

(Byrne, 2015)

Mental Models and Spatial Relations

- *the knife is on the right of the fork, and the napkin is on the left of the knife*

Napkin   Fork   Knife

Figure 10: mental_models

Mental Models and Alternative Possibilities

- *the knife is on the right of the fork, and the napkin is on the left of the knife*
- Is the fork is on the right of the napkin?

Mental Models and Alternative Possibilities

- *the knife is on the right of the fork, and the napkin is on the left of the knife*

Napkin	Fork	Knife
Fork	Napkin	Knife

Mental Models and Alternative Possibilities

- *the knife is on the right of the fork, and the napkin is on the left of the knife*

- Is the fork is on the right of the napkin?
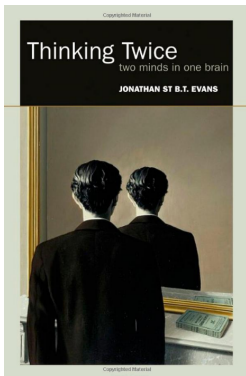
Napkin   Fork   Knife

Fork   Napkin   Knife

Uses of Mental Models

- Counterfactuals (if)
- "Logical" conclusions
- Counter examples
- Everyday reasoning

- Mental model is "generated" by System 1 but System 2 "uses" it

Further Reading

(Evans, 2010)

Figure 11:
mental_models

(Johnson-Laird, 2006)

Activity

- In Groups:
    - Evaluate the theories of decision Making discussed
        - listing strengths and limitations of each

References

References

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